NASA STTR 2015 Phase I Solicitation

T13 Ground and Launch Systems Processing

Lead Center: HQ

The goal of this topic is to provide a flexible and sustainable US capability for ground processing as well as launch, mission, and recovery operations to significantly increase safe access to space. The Ground and Launch Systems Processing topic consists of four technology subareas, including:

- Technologies to optimize the operational life-cycle.
- Environmental and green technologies.
- Technologies to increase reliability and mission availability.
- Technologies to improve mission safety/mission risk.

The primary benefit derived from advances in this technology area is reduced cost, freeing funds for other investments.

Subtopics

T13.01 Advanced Propulsion System Ground Test and Launch Technology

Lead Center: SSC

Participating Center(s): KSC, MSFC

Rocket propulsion development is enabled by rigorous ground testing to mitigate the risk inherent in spaceflight. As next generation propulsion systems are developed matching/related advancements in test technologies to appropriately test the new propulsion systems as well as more overall advancements in test technologies are also required. This subtopic area seeks to develop advanced ground test component and systems technologies to reduce cost and schedule, to improve reliability and quality, and to increase safety in Rocket Propulsion Testing. Many of these types of technologies may also have benefit for launch operations. Specific technologies of interest:

- Innovative Facility Components. Efficient generation of high temperature (>2500°R), high flowrate (<60 lb/sec) hydrogen, devices for measurement of pressure, temperature, strain and radiation in a high temperature and/or radiation environment, Development of innovative rocket test facility components (e.g., valves, flowmeters, actuators, tanks, etc.) for ultra-high pressure (>8000 psi), high flow rate (>100 lbm/sec) and cryogenic environments. Robust and reliable component designs which are oxygen compatible and can operate efficiency in high vibro-acoustic, environments.
- Advanced Test Facility Monitoring. Embedded sensor systems to provide advanced diagnostics to monitor

test facility parameters includes high-speed, simultaneous heat flux, temperature, pressure, strain and near-field acoustics. This includes remote monitoring of vacuum line, gas leaks and fire, where the use of wireless/self-powered sensors to eliminate power and data wires would be beneficial. The proposed innovative systems must lead to improved safety and reduced test costs by allowing real-time analysis of data, information, and knowledge through efficient interfaces to enable integrated awareness of the system condition by users.

- Advanced Test Imaging & Analysis. Advanced test imaging technologies providing ultra-high dynamic imaging ranges with frame rates suitable for high speed event reconstruction. The proposed innovative systems must be capable of imaging at better than 500 frames/sec, IRIG-B compatible, and with ultra-high contrast ratio. The image data must also be transferred and recorded in real time, remote from the camera optics. It must also be capable of recovering from saturated pixels from very bright objects. Ability to analyze object speed and trajectory through stereo imaging is highly desirable.

Phase I will develop feasibility studies, validate system concepts and possibly produce prototypes. Phase II will development prototype hardware and validate the technology readiness for meeting ground and launch propulsion test requirements.